Journal of Physical Chemistry C 2015 vol.119 N49, pages 27410-27415

Quantitative Analysis of Lewis Acid Centers of γ-Alumina by Using EPR of the Adsorbed Anthraquinone as a Probe Molecule: Comparison with the Pyridine, Carbon Monoxide IR, and TPD of Ammonia

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Abstract

© 2015 American Chemical Society. Quantitative electron paramagnetic resonance (EPR) measurements were done on the alumina oxide surface by using 9,10-anthraquinone probe (AQ) with the AQ amount in the range of (0.5-20) wt %. The nature of three paramagnetic centers observed simultaneously is ascribed to the strong, medium, and weak Al Lewis acid sites on the basis of combined EPR study/infrared (IR) spectroscopy of the adsorbed CO and pyridine/temperature-programmed desorption (TPD) of ammonia. It is shown how the optimal concentration of AQ probe molecule for the exhaustive quantitative examination of alumina surface can be determined directly from EPR. A possibility to characterize the surface distribution of Lewis acid centers by AQ molecules is discussed.

http://dx.doi.org/10.1021/acs.jpcc.5b09759